

1 **Claim Amendment Summary**

2 **Claims pending**

- 3 • At time of the Action: Claims 1-43.
- 4 • After this Response: Claims 2, 3, 5-16, 18-20, 24, 25, 27-32, 35, 36,
- 5 40, 41, and 43.

6 **Canceled or Withdrawn claims:** 1, 4, 17, 21-23, 26, 33, 34, 37-39, and

7 42.

8 **Amended claims:** 18-20, and 25.

9 **New claims:** none.

10

11 **Amended Claims (Clean):**

12

13 Please amend claims 18-20, and 25 as indicated below:

14

15 **1. (cancelled)**

16

17 **2. (previously amended)** An audio watermarking system comprising:

18 *ent* a pattern generator to generate both a strong watermark and a weak

19 watermark; and

20 a watermark insertion unit to insert the strong watermark and the weak

21 watermark into the audio signal,

22 wherein the watermark insertion unit selectively inserts either the strong

23 watermark or the weak watermark into segments of the signal according to an

24 audible measure of the segments.

25

2.
3.

(previously amended) An audio watermarking system comprising:

a pattern generator to generate both a strong watermark and a weak watermark;

a watermark insertion unit to insert the strong watermark and the weak watermark into the audio signal;

a processor to determine a hearing threshold for the audio signal; and

the watermark insertion unit inserts the strong watermark when the signal exceeds the hearing threshold and inserts the weak watermark when the signal falls below the hearing threshold.

4. (cancelled)

5. (previously amended) An audio watermark encoding system comprising:

a converter to convert an audio signal into magnitude and phase components;

a mask processor to determine a hearing threshold for corresponding magnitude components;

a pattern generator to generate both a strong watermark and a weak watermark; and

a watermark insertion unit to selectively insert one of either the strong watermark or the weak watermark into the audio signal based on whether the magnitude components exceed or fall below the hearing threshold.

1 6. An audio watermark encoding system as recited in claim 5, wherein
2 the watermark insertion unit inserts the strong watermark when the magnitude
3 component exceeds the hearing threshold and inserts the weak watermark when
4 the magnitude component falls below the hearing threshold.

5
6 7. An audio watermark encoding system as recited in claim 5, wherein
7 the watermark insertion unit inserts the strong watermark when the magnitude
8 component exceeds the hearing threshold by a predetermined amount and inserts
9 the weak watermark when the magnitude component falls below the hearing
10 threshold by the predetermined amount.

11
12 8. An audio watermark encoding system as recited in claim 5, wherein
13 the watermark insertion unit foregoes inserting the strong watermark or the weak
14 watermark when the magnitude component lies within the predetermined amount
15 above and below the hearing threshold.

16
17 9. An audio encoding system comprising:
18 an audio watermark encoding system as recited in claim 5; and
19 a compression unit, wherein the compression unit and the audio watermark
20 encoding system both utilize the magnitude components.

21
22 10. An operating system comprising an audio watermark encoding
23 system as recited in claim 5.
24
25

1 11. **(previously amended)** A watermark insertion unit, comprising:

2 an input to receive frequency magnitude components of an audio signal,
3 hearing thresholds derived from the magnitude components, strong watermark
4 values, and weak watermark values; and

5 multiple insertion operators for selectively combining the magnitude
6 components and one of either the strong watermark values or the weak watermark
7 values depending upon whether the magnitude components exceed or fall below
8 the hearing thresholds.

9 23.
10 12. **(previously amended)** An audio watermark detection system,
11 comprising:

12 an input module configured to receive a watermarked audio signal;
13 a synchronization module configured to determine which portion of the
14 watermarked audio signal might contain a watermark; and

15 a correlation module configured to detect whether a watermark is present in
16 the portion of the watermarked audio signal that the synchronization module
17 determines might contain a watermark and, if a watermark is detected, further
18 configured to determine whether that watermark is either a strong watermark or a
19 weak watermark.

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24.
13. (previously amended) An audio watermark detection system as
recited in claim ²³12, wherein the correlation module is further configured to
compute a correlation value from the watermarked audio signal and the strong
watermark that tends toward a first value when the strong watermark is present
and a second value when the strong watermark is not present.

25.
14. (previously amended) An audio watermark detection system as
recited in claim ²³12, wherein the correlation module is further configured to
compute a correlation value from the watermarked audio signal and the weak
watermark that tends toward a first value when the weak watermark is present and
a second value when the weak watermark is not present.

26.
15. (previously amended) An audio watermark detection system as
recited in claim ²³12, wherein the correlation module is further configured to
compute a correlation value from the watermarked audio signal and one of either
the strong watermark or the weak watermark, the correlation module determining
that said one strong watermark or weak watermark is present when the correlation
value exceeds a predetermined threshold plus a random amount.

27.
16. An operating system comprising an audio watermark detection
system as recited in claim ²³12.

17. (cancelled)

29.
18.

(re-presented in independent form) An audio watermark detection system comprising:

a pattern generator configured to generate both a strong watermark and a weak watermark; and

a watermark detector configured to detect whether a watermark is present in a portion of the watermarked audio signal and, if a watermark is detected, further configured to determine whether that watermark is either a strong or a weak watermark,

wherein the watermark detector is further configured to compute correlation values from the watermarked audio signal and each of the strong watermark and the weak watermark and to determine whether that watermark is either the strong watermark or the weak watermark based on whether the correlation values exceed a predetermined threshold.

28.
19.

(re-presented in independent form) An audio watermark detection system comprising:

a pattern generator configured to generate both a strong watermark and a weak watermark; and

a watermark detector configured to detect whether a watermark is present in a portion of the watermarked audio signal and, if a watermark is detected, further configured to determine whether that watermark is either a strong or a weak watermark;

a random operator for generating a random value; and

the watermark detector being further configured to compute correlation values from the watermarked audio signal and each of the strong watermark and

1 the weak watermark and to determine whether that watermark is either the strong
2 watermark or the weak watermark based on whether the correlation values exceed
3 a predetermined threshold plus the random value.

4 ^{12.}
5 ~~20.~~ (re-presented in independent form) An audio decoding system
6 comprising:

7 an audio watermark detection system comprising:

8 a pattern generator configured to generate both a strong watermark
9 and a weak watermark; and

10 a watermark detector configured to detect whether a watermark is
11 present in a portion of the watermarked audio signal and, if a watermark is
12 detected, further configured to determine whether that watermark is either a
13 strong or a weak watermark;

14 a converter configured to convert a watermarked audio signal into
15 magnitude and phase components;

16 a mask processor configured to determine a hearing threshold for
17 corresponding magnitude components; and

18 a decompression unit, wherein the decompression unit and the audio
19 watermark detection system both utilize the magnitude components.

20
21 21. (cancelled)

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23 22. (cancelled)
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25

23. (cancelled)

13.

24. (previously amended) An audio watermarking architecture comprising:

a watermark encoding system configured to selectively insert either a strong watermark or a weak watermark into segments of an audio signal; and

a watermark detecting system configured to detect a presence of either the strong watermark or the weak watermark in the segments of the audio signal

wherein the watermark encoding system comprises:

a converter configured to convert the audio signal into magnitude and phase components;

a mask processor configured to determine a hearing threshold for corresponding magnitude components;

a pattern generator configured to generate both the strong watermark and the weak watermark; and

a watermark configured insertion unit to selectively insert one of either the strong watermark or the weak watermark into the audio signal based on whether the magnitude components exceed or fall below the hearing threshold.

30.

25. (re-presented in independent form) An audio watermarking architecture comprising:

a watermark encoding system configured to selectively insert either a strong watermark or a weak watermark into segments of an audio signal; and

1 a watermark detecting system configured to detect a presence of either the
2 strong watermark or the weak watermark in the segments of the audio signal

3 wherein the watermark detecting system comprises:

4 a converter configured to convert a watermarked audio signal into
5 magnitude and phase components;

6 a mask processor configured to determine a hearing threshold for
7 corresponding magnitude components;

8 a pattern generator configured to generate both a strong watermark
9 and a weak watermark; and

10 a watermark detector configured to detect whether a watermark is
11 present in a portion of the watermarked audio signal and, if a watermark is
12 detected, further configured to determine whether that watermark is either
13 the strong or the weak watermark.

14
15 26. (cancelled)

16
17 27. A method for watermarking an audio signal, comprising:

18 comparing samples of the audio signal to a hearing threshold;

19 watermarking samples exceeding the hearing threshold with a strong
20 watermark; and

21 watermarking samples falling below the hearing threshold with a weak
22 watermark.

15
28. A method as recited in claim 27, wherein the watermarking samples
comprises:

watermarking samples exceeding the hearing threshold plus a buffer value
with a strong watermark;

watermarking samples falling below the hearing threshold by less than the
buffer value with a weak watermark; and

leaving samples lying within the buffer value above and below the hearing
threshold without a watermark.

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cont
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29. A method as recited in claim 27, further comprising detecting the
strong watermark and the weak watermark in the audio signal.

17
30. A method as recited in claim 27, wherein the detecting comprises
computing a correlation value from the audio signal and the strong watermark, the
correlation value tending toward a first value when the strong watermark is present
and a second value when the strong watermark is not present.

18
31. A method as recited in claim 27, wherein the detecting comprises
computing a correlation value from the audio signal and the weak watermark, the
correlation value tending toward a first value when the weak watermark is present
and a second value when the weak watermark is not present.

19.
32. A method as recited in claim ¹⁴27, further comprising:

2 computing a correlation value from the audio signal and one of the strong
3 watermark or the weak watermark; and

4 determining that said one strong watermark or weak watermark is present
5 when the correlation value exceeds a predetermined threshold plus a random
6 amount.

21
8 33. (cancelled)

10 34. (cancelled)

11 21.
12 35. A computer readable medium having computer executable
13 instructions for:

14 comparing samples of an audio signal to a hearing threshold;

15 watermarking samples exceeding the hearing threshold with a strong
16 watermark; and

17 watermarking samples falling below the hearing threshold with a weak
18 watermark.

19 4.
20 36. (previously amended) An audio watermarking system comprising:

21 a pattern generator to generate both a strong watermark and a weak
22 watermark; and

23 a watermark insertion unit to insert the strong watermark and the weak
24 watermark into the audio signal,
25

1 wherein the watermark insertion unit selectively inserts either the strong
2 watermark or the weak watermark into segments of the signal according to an
3 audible measure of the segments.

4
5 **37. (cancelled)**

6
7 **38. (cancelled)**

8
9 **39. (cancelled)**

10
11 **40. (previously amended)** An audio watermarking system
12 comprising:

13 a pattern generator configured to generate both a strong watermark and a
14 weak watermark; and

15 a watermark insertion unit configured to insert the strong watermark into
16 one or more first segments of the audio signal and to insert the weak watermark
17 into one or more second segments of the audio signal, wherein the first and second
18 segments are separate, wherein the watermark insertion unit selectively chooses
19 segments for insertion of the weak watermark according to an audible measure of
20 the segments.

21
22 **41. (previously amended)** An audio watermarking system comprising:

23 a pattern generator configured to generate both a strong watermark and a
24 weak watermark; and
25

1 a watermark insertion unit configured to insert the strong watermark into
2 one or more first segments of the audio signal and to insert the weak watermark
3 into one or more second segments of the audio signal, wherein the first and second
4 segments are separate;

5 a processor configured to determine a hearing threshold for segments of the
6 audio signal; and

7 the watermark insertion unit being further configured to insert the strong
8 watermark into a segment when the signal of that segment exceeds the hearing
9 threshold and inserts the weak watermark into a segment when the signal of that
10 segment falls below the hearing threshold.

11
12 42. (cancelled)

13
14 43. A method as recited in claim 27, further comprising:

15 computing a correlation value from the audio signal and one of either the
16 strong watermark or the weak watermark; and

17 determining that either said one strong watermark or said one weak
18 watermark is present when the correlation value exceeds a predetermined
19 threshold plus a random amount.

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